

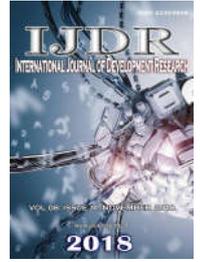


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LOWER LIMBS STRENGTH IN ELDERLY PEOPLE FROM THE PHYSIOTHERAPY INTERVENTION

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ABSTRACT

Objective: This study looked for assessing the lower limbs strength gain from the physiotherapy intervention. **Methods:** It is an interventional, cross-sectional, analytical and quantitative study with 17 elderly people enrolled in a Vitória da Conquista Health Unit. A sociodemographic questionnaire was applied, and then the sit to stand test. Afterwards, the intervention began, comprised by exercises of resistance and the delivery of an informative booklet. The intervention was carried out for 30 days, twice a week, 60 minutes each, resulting in 10 sessions. The test was once more applied for reassessment of lower limbs strength. Data were tabulated and examined in SPSS 21.0, and the T Student test was done to check the group differences. **Results:** it was identified a higher frequency of female elderly people, 64.7%. When the subjects were assessed before the intervention, it was noticed that there was a decrease in the average time to perform the sit to stand test, and these data were significantly linked to the intervention program ($p = 0.022$). **Conclusion:** Through this study it was possible to conclude that the physiotherapeutic intervention program enhances the strength of the lower limbs of the elderly people, attested by the higher speed in performing the test.

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INTRODUCTION

The aging process is presenting a significant rise worldwide, being stated by the fact of birth reduction and death rates and the rise of life expectancy (Bresqui *et al.*, 2015). The estimation is that in 2025 the number of people aged over 60 years old surpasses 30 million, turning Brazil into the sixth country with the largest contingent of elderly people in the world which may be followed by chronic diseases, since the inherent changes in the aging process cause repercussions in the various aspects of the subjects' lives (Dawalibi, Anacleto, Witter, Goulart, and Aquino, 2013). With the age progression, numerous physiological and social manifestations happens with the elderly people, leading to a global decrease in the subject's functional capacity, producing limitations and

making them prone to numerous diseases, thus decreasing their quality of life (Silva, Aires, Figueira, Bogéa, and Mendonça, 2017). The musculoskeletal system in the aging process goes through a reduction of motor units, muscle fibers and fibers size type II, causing a loss of muscle strength and power. There is also a proprioception and reaction time deterioration, as there is a delay in the action moment that may lead to the fall factor and the independence loss (Gaedtke and Morat, 2015). For these damages to be alleviated or delayed, reaching a successful aging, it is needed that the person pursues specific intervention proposals, such as functional kinesiotherapy, relating it to a better social interaction and a proper nutrition according to the necessity of each one, so as to minimize these conditions and their consequences (Resende Neto, Grigoletto, Santos, e Cyrino, 2016). In this regard, the functional kinesiotherapy is highlighted among the exercise possibilities to be operated with the elderly people, for working primarily the functional capacity of the human being, focusing on the

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development of muscular strength and flexibility through exercises that offer stimulation to the body control, acting on static and dynamic muscle balance, therefore reducing the injuries occurrence and promoting movement efficiency (Neves and Macedo, 2015). This way, through neuromuscular and aerobic stimulation, they add the proprioceptive stimuli, agility and coordination, to offer good control, stabilization and motor coordination which are essential to the life of the elderly people who undergo this natural process changes (Neves *et al.*, 2014). For the elderly person to carry out effectively the several movements of their daily life activities, it is needed among other factors, suitable conditions of muscle strength and flexibility. However, with the age advancing, it is noticed that these valences are being decreased, affecting their functionality (Mazini *et al.*, 2015). Based on the considerations above mentioned, it is understood the importance to practice regular physical exercises, such as functional kinesiotherapy, with a focus on increasing muscle strength, flexibility gain, and other physical fitness components to soften or reverse the accompanying negative effects the process of human aging. This study has as goal to assess the lower limb strength gain (LLS) from a physiotherapeutic intervention program.

MATERIAL AND METHODS

It is an interventional, cross-sectional, analytical and descriptive study, with a quantitative approach, bound to the matrix research "Falls and Associated Factors in Elderly people", approved by FAINOR's Research Ethics Committee (CEP), through opinion of number: 1,859,525, which was carried out in a traditional Basic Health Unit in the city of Vitória da Conquista, situated in the Southwest of Bahia, occupying a territorial area of 3204.257 Km², with an estimated population of 348,718, which goes through constant process of aging (Brazilian Institute of Geography and Statistics [IBGE], 2017). The city presents 7 traditional Basic Health Units which offer basic and free services where it is offered spontaneous demand or referral services. The selection criterion used for the unit's selection was made by simple draw, so that it does not affect the research direction. There were included on the study subjects aged 60 years or over enrolled in the selected Basic Health Unit, who showed regularity and availability to participate in all research stages. There were excluded from the study those who were unable to comprehend the questions or did not conclude some of the study stages, those who had amputation of upper and lower limbs and also the ones who use prosthesis, crutches that would prevent them from performing the strength test. After criteria application and considering that some elderly people refused to participate, the final sample of the research was 17 subjects. For the data gathering, a meeting was carried with the health professionals that work at the local Unit to enlighten the goals, risks and benefits of the research. The elderly people took part in the study voluntarily, and the acceptance was formalized by signing the Informed Consent Term (ICT), signed in two copies, one of them belonged to the participant and the other by the researcher responsible for the study. Afterwards, for the data investigation a questionnaire was used, it was composed of sociodemographic variables, followed by the strength assessment by the sit to stand test which was performed by sitting and getting up from a chair for five times straight, without using the upper limbs to give support. The test followed the standardization of Barbosa, Souza, Lebrão, Laurenti, and Marucci (2005) which recommends primarily a pre-test performance, where the

elderly person fold the arms across the chest and stands from the chair. If the patient is capable to stand from the chair safely and says to be able to accomplish the test, it will continue, the evaluator measure the time while the elderly person performs the test for five times if he/she is unable to complete the test without support from the upper limbs or is not judged able to do so, the test is ended. If the subject cannot stand all five times from the chair or if the test is completed in more than 60 seconds, no punctuation is granted. After the primary gathering, the first data were assessed and from this the intervention protocol was started. The intervention consisted of exercises for lower limbs (LL) and upper limbs (UL). For UL were performed: shoulder flexion and abduction, elbow flexion, wrist flexion and extension, with 1 kg dumbbells, with 4 sets and 8 repetitions. For the LL, the planned exercises were: hip flexion and abduction, using 2 kg shin guards, 4 sets and 8 repetitions; exercise of sitting and getting up of the chair, being 4 sets with 8 repetitions; and ending with a double task circuit, where the lateral gait was carried out on the ladder, using the mini band on the LL and with each hip abduction the elderly person passed the 1 kg dumbbell from one hand to the other to the front and back, for 6 times. It was also performed in the cones circuit, where it was connected ankle dorsiflexion to the beginning of the circuit, being in sedestation, then it was done the cones path and, in the end, plantar flexion, both 6 times, followed by the delivery of the informative booklet. The intervention was made with a duration of 30 days, 2 times a week, 60 minutes, resulting in 10 sessions. On the last intervention day, it was performed the reassessment of participants, applying the sit-to-stand test and orientation to the elderly people. After data acquisition, these were tabulated and examined in SPSS 21.0, being carried out the descriptive analysis of the study variables through the absolute and relative frequency distributions for all interest variables. To check the association between the mean of pre and post-intervention tests, the T Student test was used. In all analysis, the confidence level adopted was 95%.

RESULTS

With the information in table 1 it was possible to check that the major part of the population was female, and they were aged between 60-70 years old, they had low schooling levels and showed at least one fall during the last year.

Table 1. Sociodemographic profile of elderly people. Vitória da Conquista, Bahia, Brazil. 2018

Variables	% answers	N	%
Age group	94,1		
60 - 70 years		12	75
71 - 80 years		4	25
Sex	100		
Male		6	35,3
Female		11	64,7
Marital Status	94,1		
Single		1	6,25
Married		11	68,75
Divorced		1	6,25
Widow(er)		3	18,75
Color	94,1		
White		9	56,25
Brown ("Pardo")		2	12,5
Black		5	31,25
Schooling	100		
Illiterate		2	11,8
Primary School		9	52,9
Incomplete High school		2	11,8
High School		4	23,5
Income	41,18		
Until 1 wage		3	42,85
Between 1 - 2 wages		4	57,15
Falling presence	100		
No		7	41,2
Yes		10	58,8

Source: research data

Examining the data in Table 2, it is noticed that after the elderly were subjected to the intervention protocol, they showed a time decrease on the sit to stand test, demonstrating an increase of the strength in LL.

Table 2. Assessment of the lower limbs strength before and after physiotherapy intervention Vitória da Conquista, Bahia, Brazil. 2018

Variables	Before	After	<i>p</i> *
Sitting and Rising Test, mean (\pm SD ²)	13,19 (4,28)	12,24 (3,16)	0,022

²Sample Standard deviation; * Paired t-Student Test..

Source: research data

DISCUSSION

The present study showed itself as essential to the elderly population, since from the physiotherapy intervention based in the kinesiotherapy it is seen gains in the lower limbs strength. In relation to the sociodemographic characteristics, it was noticed that most participants were female (64.7%), data that were similar to other studies with an elderly population that also encountered a higher number of elderly women (Araújo *et al.*, 2017; Campos, Vianna, and Campos, 2013; Miranda, Athayde, and Barbosa, 2018). Sardinha and Cantanhêde (2018) enlighten these findings when they state that women have a longer life expectancy because they look for the health services the most, taking care of themselves and giving more attention to future events. Another data that has also drawn attention in the study was the high number of elderly people falling (58.8%). The falls present a high percentage in the elderly people, causing damage to his/her health, where this reality is reported by several national and international studies. In a study carried out by Chianca *et al.* (2013) with 108 elderly people in Belo Horizonte / Minas Gerais, it was found a proportion of falls among the elderly people of 59.3% (n = 64), also corroborating the data on the fall prevalence encountered in other studies (Araújo *et al.*, 2017; Vieira *et al.*, 2017).

The consequences with the falling factors are preoccupying, since when the elderly person falls the chances of suffering fractures are high, they may be hospitalized, present independence damage, increase tendency to suffer a fall again, increased fear of falling, difficulties in the functional activities accomplishment, higher risk of institutionalization and mortality, and other negative events (Campos, Vianna, and Campos, 2013). Therefore, the scientific community has been studying the benefits caused by the functional kinesiotherapy on muscle strength, where it is possible to observe enhancement in strength and balance, this way reducing the number of falls in elderly people. When undergoing the analysis looking for investigation the link between the protocol of physiotherapeutic intervention and the gain in lower limbs strength, it was detected that the elderly displayed a reduction in the time of execution of the sit to stand test, proving the growth in the strength of lower limbs, and showing how much exercise expands the individual's functional capacity. Tomicki *et al.* (2017) display in their study the importance of performing physical exercises, with the goal of diminishing the loss of muscular strength related to aging, in order to expand the functional capacity and therefore decrease the falls number. In the study performed with 20 active elderly, of both sexes, residents in the city of Bebedouro/SP, it was presented satisfying outcomes after the intervention, where the resistance training for lower limbs was efficient in favor of the strength gain. It was also detected that the strengthening between

important muscle groups foment the enhancement of balance and functional capacity (Scarpim and Arroyo, 2013). In a study with a sample of 622 elderly people, carried out in the city of Uberaba- MG, with the goal of assessing the predictive potential and estimating the cutoff points of lower limb strength for functional incapacity, it was obtained outcome that confirm that the lower limbs strength may be used as a predictor of functional disability in the elderly people. They concluded that strength training in association with other types of training was already advised by the scientific community due to the beneficial results that present the health of the elderly, minimizing the damages caused by the aging process (Santos *et al.*, 2013). Cordeiro *et al.* (2014) demonstrated in their studies that the exercises may provide beneficial changes to the central nervous system, improving cerebral circulation, changing the degradation and synthesis of neurotransmitters, humoral and neuroendocrine modifications and also the rise of growth factors, showing enhancement in the elderly people's memory.

In a study performed with the goal of describing the benefits of physical exercise for the health and life quality of the elderly people, they described the importance of the social interaction that the exercises generate, particularly when done in a group and with regularity, therefore improving emotional psychological factors and behavioral actions, positively altering family relations and the social environment, which consequently enhances the quality of life (Silva, Brazil, Furtado, Costa, and Farinatti, 2014). Concerning gait and balance, a study was performed with a sample of 20 elderly people, comprised of participants from an elderly group living in the city of Uiraúna-PB, where it was carried out a posture school program linked to the physiotherapeutic exercises practice. Assessing these two aspects, the outcomes show that the subjects participating in the Program improved their balance and gait. The results illustrate that functional training offers beneficial changes in balance, muscular strength and flexibility amongst other factors, impacting the mobility enhancement and contributing to the reduction of functional dependence. These advances are important to promote changes in functional capacity and consequently reduce the falling risks (Sarmiento, Sobreira, and Oliveira, 2014). The study's limitations are linked to the reduced sample number, because some elderly people were not able to participate in the study due to the time and the transportation difficulty to the intervention place, in addition to some of them giving up during the process and not finishing the sessions.

Conclusion

It is concluded that the lower limbs strength, assessed through the test of sitting and stand of a chair, reported a decrease in the time of its performance, demonstrating the strength gain from the physiotherapeutic intervention program. This finding confirms that the practice of functional kinesiotherapy promotes an improvement in the LL strength, pointing that strength training for lower limbs should be inserted into the elderly training routine, targeting the independence enhancement and the functional safety during the aging process. This paper conveys as contribution to society the physiotherapeutic intervention proposal oriented to improve the elderly people functional capacity, primarily for the gain of LL strength reducing this way, the number of falls. It is necessary to perform further research in order to provide an

enhancement in the rehabilitation of elderly patients who are predisposed to falling.

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